

**ASHLY**

**owner's manual**

**FTX-SERIES  
CFT-SERIES**  
MOS-FET POWER AMPLIFIERS

ASHLY AUDIO, INC.

lower than their maximum rating). The MOSFET will even withstand a dead shorted output resulting in very high drain current without any protection circuitry for a very short time.

MOSFETS also do not have a "storage time" associated with them (a phenomenon found in bipolar transistors in which a certain amount of time is required to turn the transistor off). Therefore the MOSFET is said to be a "fast" device which can function very accurately with high amplitude/high frequency signals and transient waveforms.

The unmatched reliability of the power MOSFET output devices and the integrity of the rugged mechanical design of the FTX series amplifiers ensure years of maintenance-free service.

## UNPACKING

As a part of our system of quality control, every Ashly product is carefully inspected before leaving the factory to ensure flawless appearance. After unpacking, please inspect for any physical damage. Save the shipping carton and all packing materials, as they were carefully designed to reduce to minimum the possibility of transportation damage should the unit again require packing and shipping. In the event that damage has occurred, immediately notify your dealer so that a written claim to cover the damages can be initiated.

The right to any claim against a public carrier can be forfeited if the carrier is not notified promptly and if the shipping carton and packing materials are not available for inspection by the carrier. Save all packing materials until the claim has been settled.

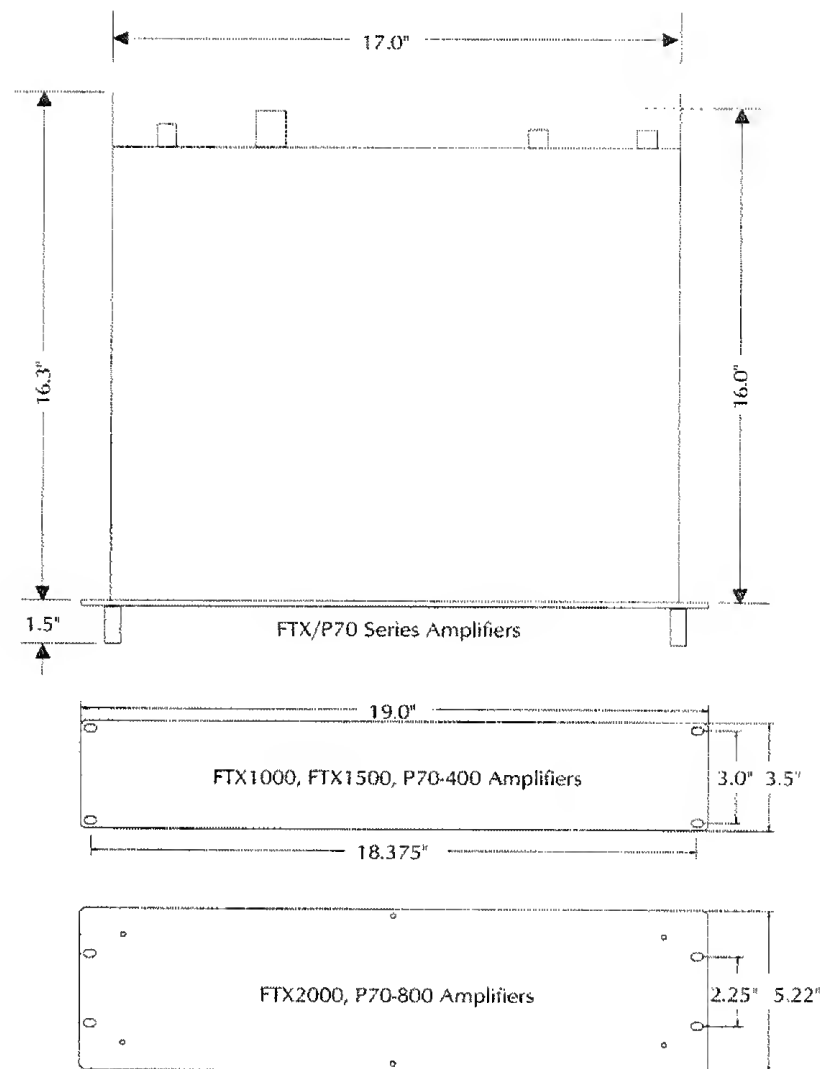
## POWER

Connect the FTX series amplifier to a standard 3-wire grounded electrical outlet supplying 120 volts, 50-60 Hz (some export models are wired for 240 volts). The power consumption is given in the specifications section.

## STANDARD CONNECTIONS AND CONTROLS

The rear panel of a FTX-2000 amplifier with the standard input panel is shown in figure 1. For descriptions of other input options available, see the section on input options.

## DIMENSIONS



## DESIGN THEORY

Ashly FTX series amplifier circuits are totally discrete using high-voltage, wide bandwidth electronics. The input section is a complimentary Darlington differential amplifier stage for high common-mode rejection, low noise and low distortion. All voltage gain stages in the amplifier operate class A for low distortion. The quasi-complimentary MOSFET output stage has almost infinite current gain, therefore the output driver stages are nearly lossless. All circuitry within the feedback loop is discrete which allows the amplifier to recover instantly and cleanly without any spikes or glitches from a clipped condition. This overall design approach inherently assures low noise, low distortion, and excellent transient and overload response.

Inputs are bridging and active balanced, and all input connections can operate as balanced or unbalanced. Turn-on delay relays are not needed because of the symmetry of the totally discrete complementary electronics.

The MOSFET output devices do not require short-circuit protection and V.I. limiting circuitry, thus enabling a simpler, more reliable electronic design. Rear panel accessible speaker fuses are provided to protect the amplifier from prolonged output shorts. These fuses are wired within the feedback loop of the amplifiers to ensure that they do not alter the audio fidelity. All electronic components are mounted to rugged glass-epoxy circuit boards. Large computer-grade electrolytic capacitors assure long service.

The FTX series amplifiers are packaged in a rugged 16-gauge steel chasses. The power transformer is located at the front center of the chassis to minimize front panel torsion. Each channel's electronics and heat sink are identical yet completely independent and modular, each with a single plug-in connector for ease of servicing. Large custom black-anodized extruded aluminum heat sinks with fan cooling provide plenty of thermal headroom.

The CFT-1800 utilizes quiet convection cooling for studio control rooms, home hi-fi, and other applications where low ambient noise is essential. Like the FTX series, the CFT-1800 is a modular design for ease of servicing. Because of the passive cooling in the CFT-1800, thermal headroom is somewhat reduced from that of forced air cooling, thus making it inadvisable to drive 4 ohm loads at continuous high power with this amplifier. It is also important to allow for free air circulation above the amplifier to achieve optimum cooling action.

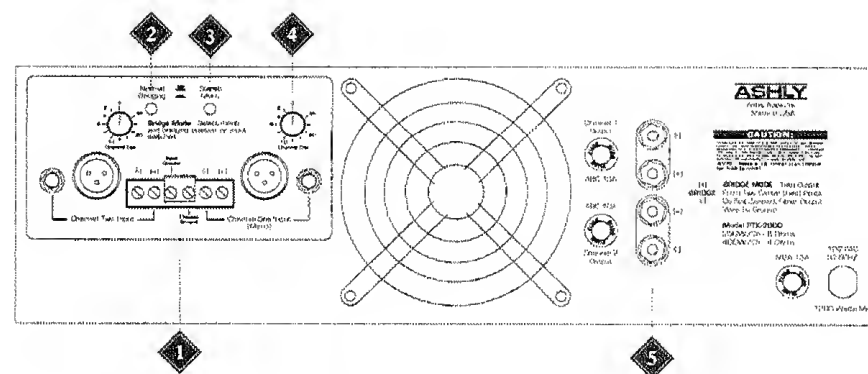


Figure 1: FTX-2000 Rear Panel With Standard Input

### 1. INPUTS

The **standard input** panel of the FTX series amps is equipped with balanced 1/4" tip-ring-sleeve (TRS) phone jacks, balanced XLR jacks, and balanced screw-terminal inputs. The three types of connectors are internally wired in parallel and may be used with balanced or unbalanced connections. The inputs are configured for pin 2 hot, meaning that a positive voltage applied to pin 2 will result in a positive output voltage across the speaker terminals. Pin 2 of the XLR jack is equivalent to the tip of the 1/4" TRS jack as shown in figure 1. An optional plug-in input transformer is available on all FTX amplifiers.

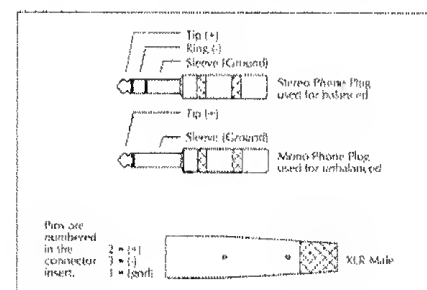


Figure 2: Input Connectors

It is recommended that balanced input connections be used when possible to reduce ground-loop and environment-induced hum and noise. If an **unbalanced input** connection is used, then the (-) connection (XLR pin 3) should be connected to input ground (XLR pin 1). If the 1/4" input jack is used unbalanced, the use of a mono (tip-sleeve) plug will automatically tie the (-) connection to input ground.

The CHASSIS GROUND terminal is internally connected to the chassis, the AC earth ground, and the power amplifier's signal ground. The INPUT GROUND terminal is tied to the XLR pin 1 and the 1/4" jack sleeve. It is recommended that the input and chassis ground terminals remain connected with the factory-supplied jumper strap.

In situations where the power amp and its signal source are separated by great distances, a ground voltage difference may exist between the amp's chassis ground and the input cable's ground. Connection of these two grounds through the jumper strap may cause large ground currents to flow (which is known as a ground loop), causing a hum noise in the amp's output. Unless you have such a situation with a hum problem that cannot be solved by using balanced input connections, the ground jumper strap should remain in place.

## 2. NORMAL/BRIDGING SWITCH

This switch selects between NORMAL mode in the "out" position where both channels are in-phase, and BRIDGING mode in the "in" position where channel 2 is switched out-of-phase. In bridging mode, the channel 1 red binding post is the (+) in-phase speaker output terminal and the channel 2 red binding post becomes the (-) out-of-phase speaker terminal. To make the switch non-accessible, its gray button is removable by simply pulling it straight off.

## 3. STEREO/MONO SWITCH

This switch selects between STEREO mode in the "out" position and MONO mode (where channel 1 input is routed to both channels of the amp) in the "in" position. In mono mode, an input signal needs only to be connected to channel 1. To make the switch non-accessible, its gray button is removable by simply pulling it straight off.

## 4. LEVEL CONTROLS

The level controls allow attenuation (calibrated in dB) of the input signal. In MONO mode, the CHANNEL ONE level control affects both output levels and CHANNEL TWO level control is unused. It is recommended that the level controls are operated at full level (0 dB attenuation) in most situations to maximize the headroom in the signal source.

## 5. SPEAKER OUTPUTS

A pair of dual banana binding posts provide the stereo speaker outputs. In BRIDGING mode, the channel 1 red binding post is the (+) in-phase speaker output terminal and the channel 2 red binding post becomes the (-) out-of-phase speaker terminal. **CAUTION! NEVER CONNECT THE TWO RED BINDING POSTS TOGETHER OR CONNECT EITHER RED BINDING POST TO A BLACK BINDING POST!**

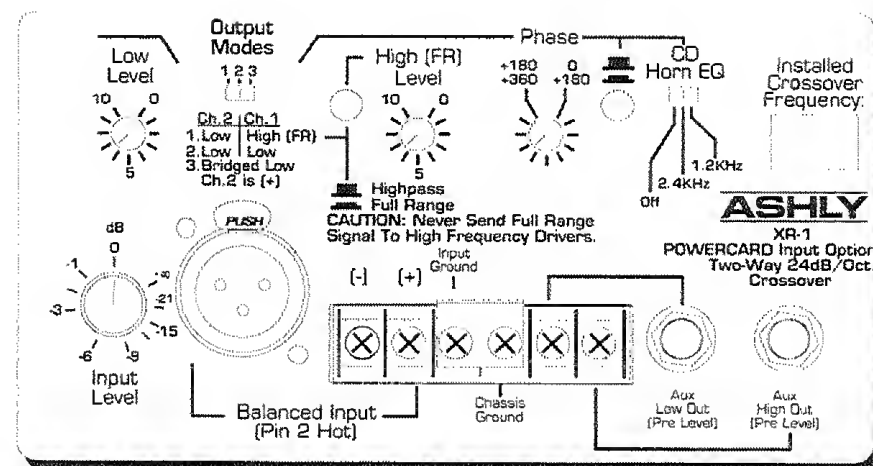


Figure 8: Crossover Input Option

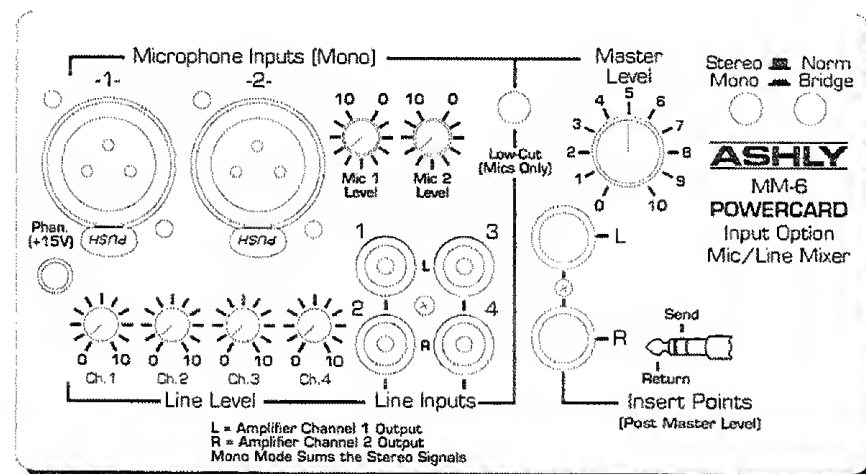


Figure 9: Mic/Line Mixer Input Option

## CROSSOVER INPUT OPTION

The crossover input option provides fixed-frequency 24 dB/octave high-pass and low pass filters allowing the two amplifier channels to operate bi-amped, full range with low out, both channels low out, or bridged low out. Auxilliary low and high outputs are available for connecting additional amplifiers. Included with the crossover input option are single in-line package (SIP) resistor networks which allow preselection between standard crossover frequencies of 160Hz, 500Hz, and 1.2KHz. 360° of phase control is provided for proper acoustical alignment of high and low frequency drivers. Constant Directivity Horn EQ is provided for both small and large horn designs. A 3rd-order 20 Hz high-pass filter is included on the low frequency crossover output to remove inaudible subsonic signals.

## MIC/LINE MIXER INPUT OPTION

The mixer input option provides four high-impedance line inputs and two balanced low-impedance microphone inputs, each with its own level control. A switchable 200 Hz high-pass filter is provided on the mic inputs to reduce unwanted low frequency noise. An internal jumper allows selection of 15 Volt phantom power applied to the mic inputs for use with condenser mics. The option has a master level control and selectable stereo, mono and bridging modes. Insert Points are available for patching external processing into the left and right channels.

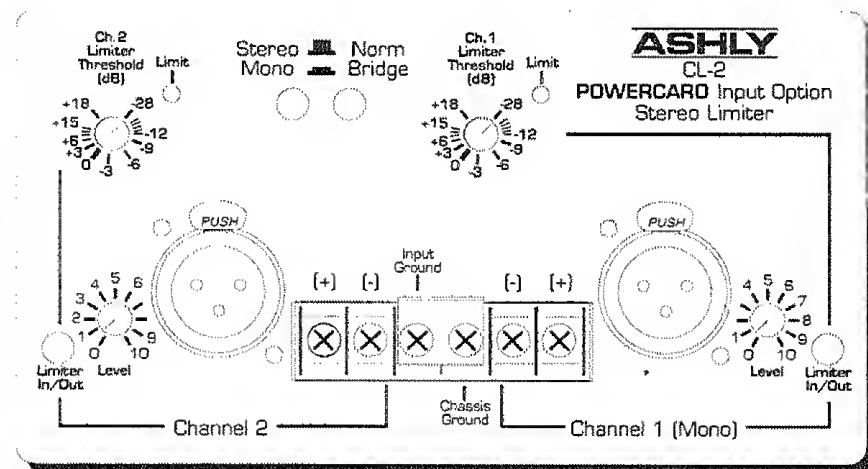


Figure 7: Limiter Input Option

## METERS

The FTX amplifiers are equipped with front panel meter displays which respond to peak output voltage. An eleven-segment, three-color LED display covers a 27 dB range. The green LED's at the left end of the meter arrays indicate a normal thermal status. In the event that the amplifier overheats, these LED's will turn off but the power switch will remain illuminated, indicating the thermal protection status. When the heat sinks return to safe operating temperatures, the amp will turn itself back on and illuminate the left-most green LED's. In the event of a blown speaker fuse, the meter display of the affected channel turns fully on. THIS DOES NOT MEAN THERE IS DC AT THE OUTPUT!

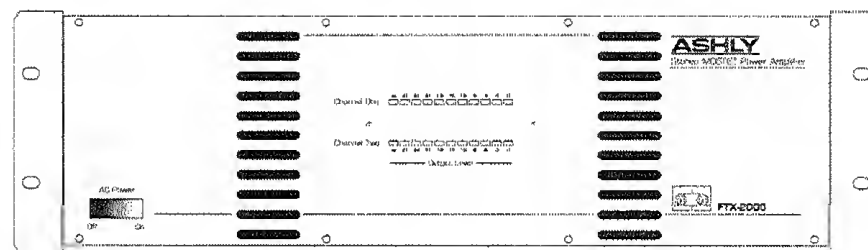


figure 3: FTX-2000 Front Panel

## TYPICAL APPLICATIONS

### STEREO OPERATION

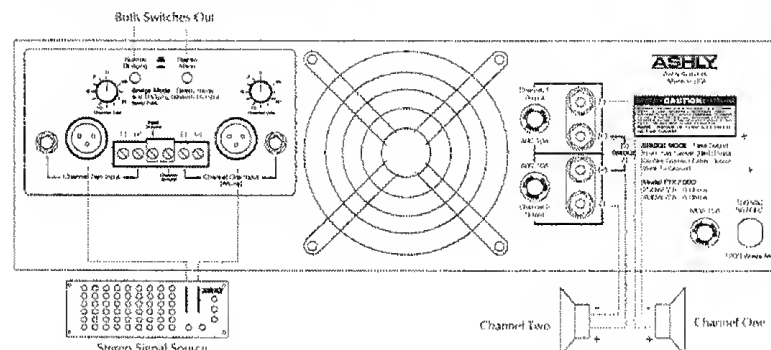


Figure 4: Operation in Normal Stereo Mode

## MONO OPERATION

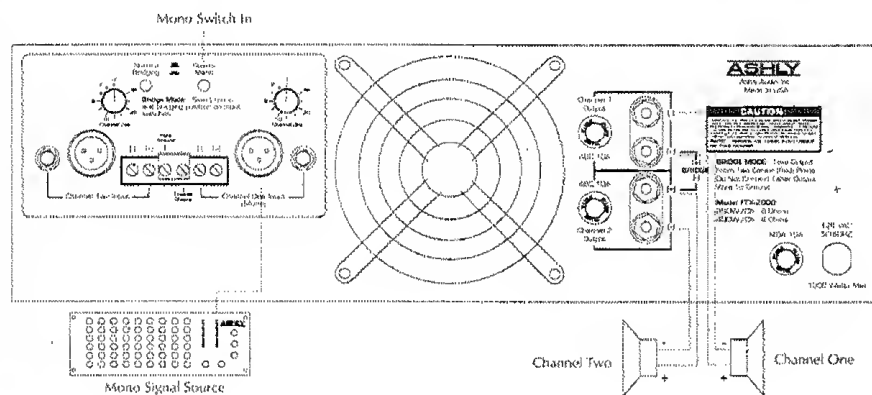


Figure 5: Operation in Normal Mono Mode

With the MONO switch depressed, the channel 1 input is routed to both amplifier channels. Both channels are then controlled by the channel 1 level control. Both outputs will be identical and can be connected to separate speakers. **CAUTION! NEVER CONNECT THE RED BINDING POSTS TOGETHER!**

## BRIDGING OPERATION

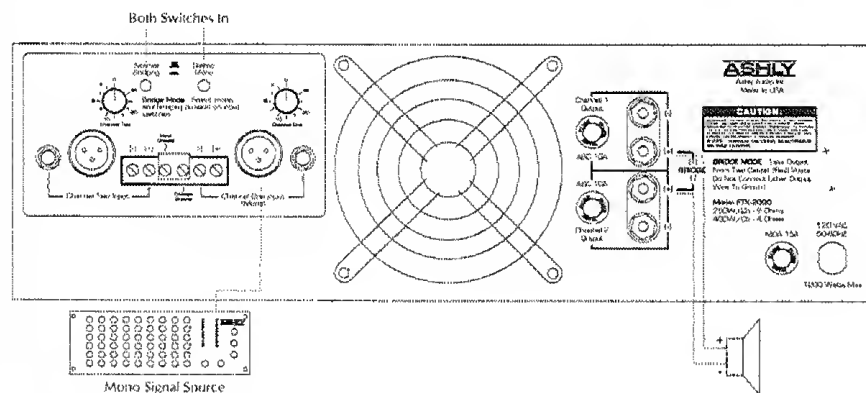


Figure 6: Operation in Bridging Mode

To operate in bridging mode, depress both the MONO switch and the BRIDGING switch. The MONO switch depressed routes the channel 1 input to both amplifier channels and the BRIDGING switch depressed inverts the phase of the input signal before it is fed to the channel 2 power amp section. The two amplifiers' outputs are therefore 180 degrees out-of-phase. The channel 1 red binding post is used as the positive speaker terminal and the channel 2 red binding post becomes the negative speaker terminal. The black binding posts are not used. **CAUTION! NEVER GROUND EITHER RED BINDING POST!**

In bridging mode, the output voltage applied to the speaker is doubled, thus providing more power to a single speaker. However, each output channel "sees" just one-half of the load impedance when in bridging mode. For example, connecting an 8-ohm speaker in bridging mode presents a 4-ohm load to each channel of the amplifier. Use caution when operating in bridging mode not to exceed the power handling capability of the speaker and the minimum load impedance on the amp.

## INPUT OPTIONS

Input option panels are available to provide built-in features such as a stereo compressor-limiter, a mic and line mixer, a crossover for bi-amplified systems, and input transformers for signal isolation. Ashly FTX series amplifiers as well as all other Ashly amps (excluding the single rack space SRA-120) will accept Ashly input option panels.

A brief description of currently stocked input options follows. Consult your dealer for detailed information on the input options, or call the factory.

### TRANSFORMER INPUT OPTION

The input isolation transformer can be installed directly into the standard input supplied with every ASHLY amplifier (except for the single rack space SRA-120). No soldering is necessary. The input transformer provides complete electrical isolation from the amplifier and its signal source to eliminate any ground-induced hum noise. The transformer input also further reduces any common-mode noise and radio frequency interference. The transformer option must be installed in the standard input panel and does not change the operation of any switches or controls.

### LIMITER INPUT OPTION

The limiter input option provides peak signal limiting from excessive input levels for speaker protection and overall level control. Separate limiter threshold controls, limit indicator LED's and limit on/off switches are provided on each channel allowing fully discrete stereo limiting operation.

## SPECIFICATIONS

	FTX-1000	FTX-1500 CFT-1800	FTX-2000
<b>Output Power</b> <i>EIA Spec.</i> ( $\pm 1\text{dB} < 1\%$ THD 20Hz-20KHz) Stereo (Rated Per Channel): 2 Ohms 4 Ohms 8 Ohms Mono Bridged: 4 Ohms 8 Ohms <i>FTC Spec.</i> (min power $< .01\%$ SMPTE IMD @ 8, $< .02\%$ IMD @ 4) Stereo (Rated Per Channel): 4 Ohms 8 Ohms Mono Bridged: 8 Ohms			
			675 Watts RMS
	190 Watts RMS	300 Watts RMS	500 Watts RMS
	120 Watts RMS	200 Watts RMS	300 Watts RMS
			1350 Watts RMS
	380 Watts RMS	600 Watts RMS	1000 Watts RMS
	160 Watts RMS	275 Watts RMS	400 Watts RMS
	100 Watts RMS	175 Watts RMS	250 Watts RMS
	320 Watts RMS	550 Watts RMS	800 Watts RMS
<b>Total Harmonic Distortion</b> (8 $\Omega$ )	.007% 1KHz .01% 20Hz .05% 20Hz-20KHz	.007% 1KHz .01% 20Hz .05% 20Hz-20KHz	.007% 1KHz .01% 20Hz .05% 20Hz-20KHz
<b>IM Distortion 8<math>\Omega</math> (SMPTE)</b> (IHF)	.007% .01%	.007% .01%	.007% .01%
<b>Damping Factor</b>	>250 20Hz-1KHz	>250 20Hz-1KHz	>250 20Hz-1KHz
<b>Bandwidth</b>	100KHz	100KHz	100KHz
<b>Slew Rate</b>	40V/ $\mu$ S	40V/ $\mu$ S	50V/ $\mu$ S
<b>Frequency Response</b>	$\pm 2\text{dB}$ 20Hz-20KHz	$\pm 2\text{dB}$ 20Hz-20KHz	$\pm 2\text{dB}$ 20Hz-20KHz
<b>Full Power Input Sensitivity</b>	1.1V	1.3V	1.7V
<b>Hum and Noise</b> (20Hz-20KHz unweighted)	>100dB below full output	>100dB below full output	>105dB below full output
<b>Power Requirement</b>	760 W Max, 100W Idle 120VAC 50-60Hz (240V available)	1200 W Max, 160W Idle 120VAC 50-60Hz (240V available)	1800 W Max, 220W Idle 120VAC 50-60Hz (240V available)
<b>Size</b>	19"Wx3.5"Hx17.8"D	19"Wx3.5"Hx17.8"D	19"Wx5.25"Hx17.8"D
<b>Shipping Weight</b>	42 lbs.	47 lbs.	65 lbs.

# ASHLY

## MOSFET POWER AMPLIFIERS

*Models FTX-1000, FTX-1500, FTX-2000, and CFT-1800*

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## INTRODUCTION . . . Why MOSFETS?

The Ashly FTX series MOSFET amplifiers combine the sonic excellence of a high-end stereo amp with the ruggedness and stamina necessary in pro audio. The FTX series amps use power MOSFETs (metal-oxide-semiconductor, field-effect transistors) for their superior audio fidelity and unmatched reliability as proven in Ashly amps for over ten years. *The CFT-1800 is a convection cooled but electrical equivalent of the FTX-1500.*

MOSFET output devices are used in the FTX series amps because of their superior performance characteristics over bipolar power transistors which are normally used in conventional power amp designs. The power MOSFET is inherently more self-regulating and does not exhibit the failure modes that bipolar transistors are susceptible to. MOSFETS do not require any thermal runaway compensation circuitry, thus making the design simpler and more reliable. MOSFETS do not exhibit secondary breakdown (an instantaneous failure in bipolar transistors when their collector current exceeds a safe level, even at voltages much